

APPENDIX A -Recent Changes in Energy Markets

1. Competition in Wholesale Electricity Markets

The year of Maine's last Comprehensive Energy Plan, 1992, turned out to be a watershed for energy markets. At that time, electric utilities in Maine and elsewhere were mostly vertically integrated, i.e., they owned most of the generating facilities used to serve their retail customers, as well as the transmission and distribution facilities in their service territories. With the enactment of the Public Utilities Regulatory Policy Act of 1978 (PURPA), and the Maine Small Power Production Act of 1979 (SPPA), Maine utilities began to supplement their own generation with purchases from cogenerators and renewable energy producers. Those purchases became significant, making up about third of Maine's electric power sources by 1992. They also significantly diversified Maine's sources of fuel for electric generation, particularly with biomass, but also with municipal solid waste and other renewable fuels. Just the same, Maine's electric energy sources were mostly from within the state, and state regulators could exercise a high degree of control over the utilities' energy resource mix.

The enactment by Congress of the Energy Policy Act of 1992 (EPACT) touched off a series of changes in the structure and operation of electric power markets whose ramifications continue to be felt to this day. As a first step toward introducing competition into wholesale power markets, EPACT authorized the Federal Energy Regulatory Commission (FERC) for the first time to compel utilities to open access to their transmission systems on a non-discriminatory basis to independent generators, marketers and others. In succeeding years, the FERC acted aggressively to remove barriers to wholesale market competition through a series of initiatives, including

- requiring utilities to file non-discriminatory open access tariffs;
- reducing regulatory burdens on new market entrants;
- requiring utilities to transfer control of their transmission grids to independent system operators;
- directing the creation of transparent spot markets for wholesale power;
- requiring standardization of wholesale power market rules between regions; and
- requiring elimination of inter-regional charges and other "seams" which tended to impede the free flow of power between regions.

From the perspective of state energy policy, what is most significant about these developments is that Maine (like other states) has lost much of its ability to control its own electric energy destiny. Increasingly, the cost of power, as well as related issues of how future needs will be met, the diversity of fuel mix, and even decisions over how transmission will be planned and paid for, are being decided either by market forces or in regional or federal forums.

To its credit, Maine has not stood by idly as these changes have occurred. As the discussion below of the state's current initiatives shows, Maine has adjusted to these changes by

reforming its policies, as well as becoming more actively involved in those regional and national policy forums.¹

2. Competition in Retail Electricity Markets

There have also been significant changes in the retail electric energy market. In 1997, the Legislature adopted the Electric Industry Restructuring Act, which compelled Maine's utilities to divest their generating assets, and directed that retail customers be free to choose their supplier of electric energy as of March 1, 2000. In effect, the Legislature unbundled energy generation from its delivery through transmission and distribution lines. The latter continued to be provided solely by the utilities, on a monopoly basis; the former was to be furnished by non-utility entities (and, with some qualifications, by non-regulated utility affiliates) on a competitive basis. For customers declining to exercise their right of choice, the state would procure energy supplies through an RFP process in the competitive wholesale market.

A discussion of developments relating to deregulation electricity markets of interest to Maine policymakers would not be complete without touching on the California energy crisis of 2000. California was a pioneer in opening its retail electric market to competition, having begun seriously planning for it in 1994. In 1996, the California Legislature, by unanimous vote, adopted a bill calling for the opening of the state's retail electric market in 1999. For a variety of reasons, many of which continue to be the subject of FERC investigations, wholesale electric prices spiked shortly after the market opened, and California's electric utilities were caught in a price squeeze, being forced to sell power at retail at prices well below its wholesale cost. The state's largest utility went bankrupt, and the state was required to finance a major bailout, which has in turn contributed to unprecedented financial difficulties for the state as a whole.² While California's experience deterred some states from introducing retail electric competition within their own borders, Maine chose to continue with its retail choice program, albeit with careful

¹ Departments and agencies actively involved in regional and national policy forums include the Governor's Office, the PUC, the OPA and the SPO. As to the PUC's involvement, See MPUC, Annual Report on Electric Restructuring, Dec. 31, 2001, p. 19:

Maine PUC Staff regularly participates in the meetings of the NEPOOL committees that formulate the market rules, reliability requirements, and transmission tariffs... If we perceive that the current rules or proposed changes threaten the ISO's independence, the market's competitiveness, or system reliability, we are able to intervene and provide informed comment at FERC consistent...

Although we are not market participants or members of NEPOOL, our participation on NEPOOL working committees helps us understand market issues as they evolve and anticipate how they will affect the markets. During the course of the meetings, we explain to market participants and the ISO any negative effects the proposed rules may have on Maine's ratepayers. When necessary, we request that either NEPOOL itself, or ISO New England, modify the rules to eliminate potential negative consequences for consumers. If our concerns are not addressed at this informal level, we develop formal filings to FERC, the final arbiter of all market rules. We work collaboratively with other New England states as we develop the filings to build a consensus position; whenever possible, our comments are filed jointly with the other state public utility commissions through the New England Conference of Public Utility Commissioners (NECPUC)....

² See <http://www.pbs.org/wgbh/pages/frontline/shows/blackout/california/>.

attention to the lessons of California.³ Maine has escaped the pitfalls of the California approach to deregulation.⁴

3. Competition in Natural Gas Transportation

1992 was also a pivotal year for national policy with respect to natural gas. In that year, the FERC issued landmark rules unbundling the sale of natural gas at wholesale from its delivery, and ordering pipelines to offer transportation service on a non-discriminatory basis to all market entities (much as the FERC later did for electricity and electric transmission lines). This resulted in increased exploration, pipeline construction, falling prices and increasing producer profits⁵. In succeeding years, the effects were felt in Maine, as development of the Sable Island gas fields off of Nova Scotia took place, and two new major pipelines, one from Nova Scotia, and a second from Quebec, were built in Maine, beginning service in 1999. While Maine still ranks among the states with the lowest household penetration of natural gas, five large natural gas fired generating plants with a combined output of 1700 MW have been built here within the last four years, and start-up local distribution gas companies have begun to expand gas service to Brunswick, Gorham, Bucksport, Sanford, Bangor and elsewhere.⁶ As is the case with respect to electric market developments, the State has also adopted policies and programs responding to these changes in the gas market.

4. Technological Change

Technological change has also contributed to the emergence of natural gas as the fuel of choice for new power plants, and that change can be traced in large part to EPACT as well. In response to Section 2112 of EPACT, the United States Department of Energy (DOE) undertook a program to increase the efficiency of gas fired plants, which then stood at 28 percent (i.e., 28 percent of the energy used to fuel the plants was converted to electricity; the rest was lost to heat). Building on lessons learned in the development of PURPA cogeneration facilities, and working closely with industry, DOE's Advanced Turbine Systems Program resulted in combined-cycle technology with efficiency rising to 60 percent – more than double that of only eight years before. Natural Gas combined-cycle plants produce less greenhouse gas emissions than either coal or oil plants, as well as reduced nitrous oxide emissions (from double-digit parts-per-million (ppm) to single-digit ppm levels). DOE estimates that 81% of new generation between now and 2010 will be gas-fired, and that overall 39% of generation will be gas-fired by 2020.⁷

Reliance on natural gas to fuel most new generating plants has policy ramifications for Maine, as well as other jurisdictions. Gas is a much cleaner-burning fuel than coal, the fuel once seen as Maine's principal alternative for large generating plants. Combined-cycle technology also represents a major advance in energy efficiency, an important goal of state policy. Just the same, natural gas remains a non-indigenous, non-renewable fuel, and one whose transportation

³ See <http://www.state.me.us/meopa/ME-CA%20PROBLEMS.htm>.

⁴ See <http://www.state.me.us/mpuc/Commissioners/RetailElecCompMEWelch.htm>.

⁵ See <http://www.platts.com/features/diversification/gasdereg.shtml>.

⁶ See <http://www.state.me.us/mpuc/annual%20report/2000-annual%20report.pdf>.

⁷ See http://www.eere.energy.gov/der/industrial_turbines/pdfs/turbine.pdf.

and combustion produce greenhouse gases. In addition, reliance on natural gas for over one third of electric generation nationwide raises important concerns for supply security and price volatility, as reflected in recent statements of the Federal Reserve Board and other officials.

There have been other significant changes relating to generating technology since 1992 as well. As to renewables, perhaps most significant is the dramatic reduction in the cost of producing electricity from wind. According to the United States Department of Energy, windpower can now be generated at a cost in the range of 5 cents/kwh.⁸ FPL Energy, the Florida-based company that bought Central Maine Power Company's fossil and hydro generating plants in 1999, is the nation's leader in installing wind turbines, with 30 wind farms in 10 states, producing 1700 MW of power.⁹

While generation from natural gas and wind is expanding, nuclear generation, which in the early 1990s met nearly half of the state's electricity demand, no longer exists in Maine. The 870 MW Maine Yankee Nuclear Plant in Wiscasset, licensed to operate until 2007, was prematurely closed in 1997 due to equipment and safety problems and rising operating costs.¹⁰ Several other nuclear plants in New England have closed for similar reasons. While there are some indications of a possible renewed interest in nuclear technology in the US, and the Bush Administration has declared itself in favor of nuclear generation of electricity, no domestic nuclear plants have been ordered since the Three Mile Island disaster in 1979.¹¹ The failure of the Department of Energy to resolve controversies and engineering challenges relating to establishment of a repository for high-level nuclear waste is also seen as a major obstacle to further investment in domestic nuclear plants.¹² Thus, one established technology that is capable of producing large amounts of electricity without greenhouse gas emissions is not likely to play a role in Maine energy policy.

5. Environmental Change

Global climate change is another external development with potential policy ramifications for Maine. While identified many years ago as a potential environmental threat, over the past decade there has been a growing consensus in scientific circles that warming is already occurring, and that emissions from human activities, primarily fossil fuel combustion, contribute to that warming. While the relationship of human activity to climate change is not free of controversy, the potential hazards of climate change are sufficiently troublesome to warrant consideration of policies that encourage efficiency and use of energy sources with lower emissions. The Kyoto Protocol was negotiated in 1998 by world leaders. It called for a return to 1990 greenhouse gas emissions levels by 2012.¹³ While the Protocol has been rejected by the Bush Administration, many other industrial nations have supported it. Maine was the first state

⁸ See <http://www.eia.doe.gov/cneaf/solar.renewables/page/wind/wind.pdf>.

⁹ See <http://www.fplenergy.com/renewable/contents/wind.shtml>.

¹⁰ See <http://users.rcn.com/agnews/nf/MaineYankeeCloses.htm>

¹¹ See <http://www.commondreams.org/headlines01/0424-03.htm>.

¹² See <http://www.agiweb.org/agi/gap/legis107/yucca.html>. Some other countries such as Korea continue to develop nuclear power plants, in part because of their perceived environmental benefits. See http://en.hdec.co.kr/service/service_sub_07.htm.

¹³ See <http://news.bbc.co.uk/1/hi/sci/tech/1248278.stm>.

to endorse it this year (see LD 845, which calls upon the State to meet the Protocol's 2010 target for greenhouse gas emissions, and more stringent targets thereafter). ¹⁴

In addition to global warming concerns, ground level ozone is another environmental issue with implications for Maine's energy policy that has gained prominence in recent years.. Maine, like other northeastern states, experiences unhealthy levels of ozone arising in significant measure from wind-borne nitrous oxide emissions of Midwest coal-fired plants.¹⁵ While reducing nitrous oxide emissions from Maine sources does little to ameliorate Maine's air quality directly, Maine has been active in seeking federal action to curtail those emissions in the Midwest. To lend moral force to Maine's position, Maine's political leaders have considered it important to show that Maine is willing to live by the same standards it would have imposed on other states. ¹⁶

¹⁴ See http://www.pewclimate.org/projects/states_greenhouse_execsumm.cfm.

¹⁵ See http://www.bredl.org/air/epa_facts.htm.

¹⁶ See http://www.bostonphoenix.com/boston/news_features/top/features/documents/01655645.htm: "One of many reasons why the New England states are working to clean up our plants," says Pete Didisheim of the Natural Resources Council, Maine's largest environmental group, "is to strengthen the region's ability to tell upwind states, 'Look, we've done what we can to clean up our plants, and to the extent to which we continue to have dirty air, we need you to do the same thing.'"

APPENDIX B - Principal Energy-Related Responsibilities of State Departments and Agencies

Public Utilities Commission	<ul style="list-style-type: none"> • Electric energy efficiency • Industrial sector energy efficiency • Renewable electric power • Affordable electric and gas rates • Electric and gas competition • Self-generation/distributed generation • Regional Advocacy
MSHA	<ul style="list-style-type: none"> • Low income household energy efficiency • Low income energy affordability • Energy efficiency public education
DOT	<ul style="list-style-type: none"> • Renewable/clean transportation fuels • Transportation energy efficiency
DAFS	<ul style="list-style-type: none"> • Energy efficiency in state facilities • Energy efficiency of state vehicles • Renewable power and fuels use in state buildings
FAME	<ul style="list-style-type: none"> • Financing energy efficiency projects • Financing renewable/clean fuel projects • Financing clean vehicles
SPO	<ul style="list-style-type: none"> • Energy policy coordination • Energy reports • Energy security • Regional energy market competition
Governor's Office	<ul style="list-style-type: none"> • Coordination of state energy policies and activities • Regional energy market competition • Energy efficiency and renewable power and fuels in state facilities • Energy efficiency in state vehicles • Energy security
OPA	<ul style="list-style-type: none"> • Energy affordability • Energy market competition • Electric and gas energy efficiency
DEP	<ul style="list-style-type: none"> • Energy efficient vehicles • Clean government
Attorney General	<ul style="list-style-type: none"> • Energy market competition
DECD	<ul style="list-style-type: none"> • Building code enforcement • Transportation efficiency (carpooling)

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APPENDIX D- GOALS, OBJECTIVES AND STRATEGIES ADOPTED BY THE PUC FOR EFFICIENCY MAINE PROGRAMS

I. Goals

- A. Improve the efficiency of electric energy use by Maine residential consumers, businesses and other organizations;
- B. Increase consumer awareness of cost effective options for conserving energy;
- C. Create more favorable, sustainable market conditions for the increased use of efficient products and services;
- D. Promote sustainable economic development; and,
- E. Reduce environmental damage associated with energy use.

II. Objectives

- A. Implement a portfolio of conservation programs pursuant to a Maine energy conservation plan.
- B. Implement an organizational model for administration and management of energy conservation programs.
- C. Review existing utility programs and implement a transition plan by the end of 2003.
- D. Create an awareness of the conservation programs and the value of energy efficiency among the general public.
- E. Increase the availability of energy efficient products and services through Maine businesses.
- F. Save a pre-defined number of kWhs through program implementation by December 2003

III. Strategies

A. Market Assessment

- 1. Conduct market assessment studies as needed to expand our knowledge and understanding of the markets for energy efficient products and services in Maine. Coordinate our market assessment efforts with others in the region where possible.
- 2. Develop market baseline measurements for efficient products and services as needed to support program design and evaluation.

B. Program design and implementation

- 1. Implement a portfolio of programs that allows all major customer groups a reasonable opportunity to participate in one or more programs.
- 2. Implement programs targeted at traditionally “hard-to-reach” markets. Target 20% of funds to programs for low-income customers, and 20% of funds to programs for small business customers.
- 3. Design programs that balance immediate primary results (cost effective kW and kWh savings) with longer-term secondary results (self-sustaining markets, economic development, environmental benefits).
- 4. Encourage the development of an energy efficiency infrastructure, resources, and skills in Maine. Use existing market channels for program delivery, where possible.
- 5. Assess current utility programs and their fit with our program plan, phase out those no longer needed, and re-design those to be carried forward.

6. Integrate customer educational efforts into all programs to promote changes in buying habits and energy usage behaviors.
7. Implement an overall marketing effort that develops a clear brand image for our programs, supports program implementation, and increases public awareness of the benefits of energy efficiency.
8. Adopt or adapt regional or national programs or programs from other states, if they will provide benefits to Maine's citizens and are consistent with these goals, objectives, and strategies.

C. Monitoring and evaluation

1. Develop tracking and evaluation criteria and procedures for each program. Coordinate our tracking and evaluation efforts with others in the region where possible.
2. Evaluate programs to a level sufficient for business decision-making.

D. Funding

1. Implement an accounting and reporting system to track revenues by source and expenditures by program and category, in sufficient detail to support evaluation and reporting needs.
2. Leverage ratepayer funds with funds from other sources where possible. Seek additional sources of funding from state, federal, and private sources, where such funding would enhance and support this plan.
3. Set incentive levels at the minimum needed to accomplish program objectives.

E. Communication, coordination, and reporting

1. Implement a process for ongoing public stakeholder communication.
2. Coordinate our efforts with other state agencies with energy-related responsibilities.
3. Monitor national and regional activities and participate in such activities when beneficial.
4. Report to the Legislature by December 1, 2003, describing the Commission's activities, programs implemented or planned, the likely cost effectiveness of programs, the financial condition of the conservation funds, and any recommended changes to the Conservation Act.

APPENDIX E- ENERGY RESOURCES COUNCIL ACTIVITIES AND ACCOMPLISHMENTS

The eight-member Energy Resources Council came into existence at a time of accelerating change in energy markets.¹⁷ The 1999 SPO Plan identified the 1997 Electric Industry Restructuring Act as a major source of change, and by 2002 it had resulted in generation divestiture by utilities, retail choice for electric consumers, the introduction of a renewable resources portfolio standard, and other developments. But there were other important changes as well, such as increased turmoil in the Mid-east; the shutdown of Maine Yankee; the construction in Maine of two major gas pipelines and a half dozen new gas-fired electric generation plants; a dramatic increase in vehicle miles traveled; further scientific evidence of global climate change; and the infrastructure security concerns arising out of the 9/11 terrorist attacks.

The Council's 2003 Work Plan and Report to the Legislature provide a clear view of the priorities of the state agencies with responsibility to develop and implement policies relating to energy. Continued emphasis on energy conservation and renewables is apparent, but there are other priorities as well, reflecting the need to respond to the new challenges of the evolving marketplace. These may be seen in the Council's statement of Shared Principles:

- Energy production, undertaken in an environmentally-sound manner, is needed from a diverse mix of resources.
- Conservation, demand management and distributed resources can be viable and cost effective strategies for meeting energy needs, and are necessary components of a balanced resource portfolio.
- Adequate and reliable energy delivery infrastructure is critical to economic growth and to continued expansion of competitive energy markets.
- Energy and environmental policy are linked, and should be addressed in an integrated manner.
- Maine's energy security depends not only on Maine-specific resources, but on energy resources throughout the region.
- Policies affecting the energy resources on which Maine depends are often developed in regional and national forums; effective representation of Maine's interests in these forums is essential.
- Active interagency coordination on state, regional and federal energy policy offers an opportunity to make more efficient and effective use of State resources.¹⁸

¹⁷ The eight members are the Commissioner of Administration and Finance, the Chair of the Public Utilities Commission, the Public Advocate, the Director of the Maine State Housing Authority, the Commissioner of Transportation, the Director of the Department of Environmental Protection, the Director of the State Planning Office, and the Director of Economic and Community Development. The Commissioner of Conservation was added in 2003.

¹⁸ Energy Resources Council, 2003 Work Plan and Report to the Legislature, pp. 5-6.

With these principles as a policy framework, the Council selected five cooperative projects for 2002-2003, summarized as follows:

1. **Energy Information.** This project will develop and maintain a shared information base of energy information. Priorities include development of a web-based system with links from a central location to energy data sites, and development of geographic information system (GIS) information on critical energy facilities and infrastructure.
2. **State Government Energy Efficiency.** The project goal is to aggressively and cost effectively improve State government energy efficiency in buildings and fleets, and develop mechanisms to effectively share information on progress with the public so that State government can lead by example.
3. **Small Business Energy Assistance.** This project is intended to improve the energy efficiency of Maine small businesses by better coordinating and leveraging agency programs, resources and expertise.
4. **Regulatory System Evaluation and Improvement.** This project will identify potential gaps, obsolescence or inefficiencies in energy-related regulations and processes, select priority issues for attention and recommend solutions.
5. **Energy Emergency Preparedness.** Under this project, the Council will produce an updated and workable Maine Energy Emergency Plan, in cooperation with the Maine Emergency Management Agency (MEMA).¹⁹

The Council also identified several issues that might be addressed as time and resources allow as well as possible matters for attention in each area, as follows:

- Energy efficiency: Additional opportunities for interagency coordination of energy efficiency activities, implementation and possible update of Maine's Energy Efficiency Building Performance Standards, public outreach and education on energy conservation, Electric Energy Conservation Fund priorities, and availability of capital for additional cost-effective energy conservation.
- State government energy use: Clean Government Initiative energy priorities, funding options for state building energy efficiency improvements, and state building conversion to natural gas.
- Alternative transportation and fuels: Opportunities for alternative fuels and infrastructure, and the role of alternative fuels and transportation efficiency in meeting energy objectives.
- Climate action: Identification and implementation of energy-related climate actions, leveraging of activities throughout the region, and estimating emissions impacts of energy-related programs and activities.
- Renewable energy and renewable fuels: Priorities for the Renewable Resource Fund and economic development opportunities involving renewable energy or fuels.
- Wholesale electricity markets: Regional transmission organizations, market design, resource adequacy, and infrastructure development.
- Federal funding: Priorities for use of State Energy Program (SEP) funds and identification of grant opportunities

¹⁹ Id., p. 7.

APPENDIX F- AGENCY WORKSHEETS

Refer to SPO's web site <http://www.maine.gov/spo/energy/energycouncil/pubs.php>

APPENDIX G

Maine's Performance in Balancing Policy Objectives

The excerpts the Ninth Report of The Maine Economic Growth Council, 2003 Measures of Growth quoted below show the State's performance in carrying out policies on energy, environment, economic development and transportation.²⁰ The numbering corresponds to the section numbers in the Report. The full report is needed to place these excerpts into the overall snapshot of Maine presented by the Maine Growth Council, but the selected sections serve to illustrate the issues facing the State.

The Economy

14. Cost of Doing Business

Benchmark: The cost of doing business in Maine, 106 index points in 1998, will decrease to less than 103 index points by 2005. Equal

Cost of Doing Business High in Maine Relative to U.S.

Maine's cost of doing business in 2001, according to this index, was 8.7 points higher than the national average cost of doing business and has increased 5% over the past 10 years. This represents a serious competitive disadvantage for Maine-based businesses. This performance measure is an important indicator of the costs of operating a business in the state of Maine relative to other states, and an important consideration for businesses looking to relocate to Maine, expand, or leave the state.

The index includes the unit cost of labor, the energy costs, and the tax burden in each state. Unit labor costs comprise 75 percent of the index, energy costs comprise 15 percent, and the tax burden is 10 percent of the total index. Unit labor costs are defined as the average wages and salaries earned per dollar of output created. The energy cost component of the index compares the average commercial and industrial electricity costs, in cents per kilowatt-hour, to the U.S. average. The tax burden is the total tax burden as a percent of total personal income indexed to the national effective tax rate, which is calculated in the same manner.

Maine was ranked 7th in the nation on this index in 2002. Maine's high rank is attributed to its high state and local tax burden, which placed Maine 3rd highest in the nation on this component of the index. On the energy index Maine was ranked 6th, and on the unit labor cost index, Maine was ranked the 18th most expensive state.

Data Source: Economy.com, United States Business Cost Review, 2003.

7. Research and Development Investment

Benchmark: Investments in research and development per Maine worker, \$255.44 in 1998, will increase to \$1,000 per worker by 2010. Plus

Research and Development Investments on the Increase

In 1999, Maine companies, nonprofits, and education institutions invested over \$225 million dollars in research and development activities. In that year, 642,500 people were working in Maine, meaning that Maine invested an average of \$349.55 per worker in research and development in 1999. That is an increase of 47% from 1997, when \$237.49 per worker was invested in Maine. Although Maine increased the amount of research and development spending per worker from 1997 to 1999, the state has a long way to go to achieve the established benchmark.

²⁰ Data Source: Maine Economic Growth Council, Measures of Growth, 2003. Summary and analysis done by the Maine Development Foundation.

Investment in research and development has been identified as a foundation and significant driver of prosperity and a high quality of life. In Maine, industry consistently invests the most money relative to other sectors in research and development - \$140 million in 1999. Still, in order to achieve the stated goal, Maine's industries will need to be even more focused on research and development. That will require continued focus on encouraging innovation and technology, including continued development of industry clusters.

State investment in support of research and development has increased significantly in the last decade in Maine. Between state fiscal years 1999 and 2003, the state appropriated an average of just over \$31 million annually in support of research and development. This compares to an average investment of just over \$4 million annually during the previous five-year period, 1994-1998.

Analysis by the Maine State Planning Office in 2002 identified research and development and bachelor's degree attainment levels as the key to increasing per-capita income in Maine. The study determined that Maine would need to spend \$1,000 (in 2001 dollars) per worker to increase its per-capita income. The benchmark for this indicator is based on this analysis.

Data Source: National Science Foundation, Division of Science Resource Studies, *National Patterns of R&D Resources*, and the Maine Science and Technology Foundation, November, 2002.

Energy

16. Cost of Energy

Benchmark: The cost of electricity for the industrial sector in Maine will decrease to less than 130 percent of the average cost of electricity for the industrial sector in the US by 2005. Plus

Maine Industrial Energy Costs Decrease Slightly

In 2001, electricity cost Maine's industrial sector an average of 7 cents per kilowatt-hour. Across the nation as a whole, the industrial sector paid an average of about 5 cents per kilowatt-hour. The graph shows that in 2001, Maine industrial electric consumers paid 39 percent more for electricity than the national average.

Both nationally and in Maine, industrial electricity prices increased from 2000 to 2001, but Maine prices increased at a slightly slower rate. Thus Maine moved closer to achieving the benchmark.

The cost of electricity is a fundamental cost of doing business and its cost reflects and affects other economic conditions. It is important that the cost of energy in Maine be competitively low in order to attract and retain businesses and to help support the vitality of the state's industrial operations. Actual lower costs may reflect lower delivery costs.

Maine's residential consumers paid 11 cents per kilowatt-hour in 2001. Nationally, residential consumers paid an average of 8.5 cents per kilowatt-hour. In 2001, Maine commercial entities paid an average of 11.3 cents per kilowatt-hour.

Electricity costs are now reported disaggregated, with the production costs separated from the transmission and distribution costs. Transmission and distribution costs include stranded costs. Stranded costs reflect net, above-market costs of generation obligations the utilities have incurred since the 1980's, prior to restructuring that occurred in the late 1990's in Maine. These costs are passed on to consumers through utilities' rates. Almost 30% of delivery costs are attributed to stranded costs, which should be reduced once the existing generation contracts expire within the next decade.

Data Source: Central Maine Power based on US Department of Energy, Energy Information Administration, Annual Electric Utility Reports, 1988-2001.

The Environment

52. Air Quality

Benchmark: The number of days that Maine experiences unhealthy air quality due to ground-level ozone will improve from 14 days in 1995 to a consistent standard of zero through 2005. Minus

Poor Air Quality Reported

In 2002 there were seventeen days that Maine's ground-level ozone was high enough to be deemed unhealthy. This is a slight increase over the summer of 2001 in which there were fifteen such days. The recent increase is mostly attributable to a combination of particularly warm weather and weather patterns that cause pollution from south and west of Maine to come this way.

Air quality is important to long-term economic growth for three reasons. First, high levels of ground-level ozone are unhealthy for Maine people, causing lost work days and other costs associated with ill health. Second, clean air is more valuable than dirty air because the dirtier the air is, the more we must reduce allowable additional pollution, and pollution reduction is costly. Third, Maine benefits economically from its reputation for being pristine. Gaining a reputation for poor air quality, whatever the cause, would work against economic growth.

The report uses the EPA standard of air quality exceedances in which days that have .08 parts per million of ground level ozone, averaged over an 8-hour period, are reported as poor air-quality days. The number of days that are reported as exceeding these levels is a product of poor air quality and the air temperature. Because ground level ozone forms when ozone gas interacts with sunlight and high temperatures, a hot, sunny summer is more likely to produce more ozone days than a cooler year.

Data Source: U.S. Environmental Protection Agency, Air Quality Division, November 2002.

33. Population of Service Center Communities [Author's note: In the MEGC Report, Section 33 was listed under "Community: Civic Assets" and not the Environment section.]

Benchmark: The percentage of Maine people who reside in service center municipalities will improve from 46 percent in 1995 to 50 percent by 2010. Minus

Residential Choices Reflect Increasing Sprawl

In 2000, about 44 percent of Maine people lived in regional service center communities whereas 40 years ago, about 60 percent lived in these communities. The continuing trend of people moving out of urban centers into the more rural parts of the state increases public costs and impoverishes Maine's central communities.

Within the boundaries of 62 specifically identified regional service center municipalities are almost three-quarters of all Maine jobs, services (hospitals, social services, education institutions, cultural activities, and government services), and the state's consumer retail sales. For the most part, these are the places in which Maine people work, shop, and visit for a wide variety of services. To the extent that people live close to or actually within these service centers, economic growth is enhanced because services are delivered more efficiently, people are not traveling as far to work and to shop, and environmental impacts of residential development are lessened in rural areas.

This year, the Maine State Planning Office revised its methodology for identifying regional service centers according to recent rule changes prescribed by the Legislature. However, the changes do not significantly affect the conclusions or the benchmark established by the Growth Council when it began tracking this performance measure in 1999.

Data Source: Maine State Planning Office, November, 2002.

Transportation

18. Transportation Infrastructure

Benchmark: The percentage of all manufacturing freight shipped in Maine that goes by rail, water, or air (11 percent in 1997) will improve relative to the amount shipped by truck, through 2005. Minus

Percent of Freight Shipped by Alternative Modes Decreases

In 2000, approximately 90 percent of all manufacturing freight tonnage transported in Maine was done by truck, while 10 percent was shipped by rail, water, and air. This represents movement away from the benchmark since 1998 when 89 percent of shipping was done by truck and 11 percent by other means.

In total, an estimated 105 million tons of freight were shipped in Maine in 2000. Overall, the amount of manufacturing freight shipped in Maine increased 17 percent from 1998 to 2000.

A good business climate requires an efficient transportation system. While trucks serve as an important means of transport in Maine, it is often more efficient to use other modes to carry large amounts of cargo. The increase in heavy truck traffic has increased traffic congestion and the rate of pavement loss and bridge stress, particularly on older local and secondary highway systems, all of which reduce the speed of travel. The situation also can translate into increased highway and bridge funding needs.

Improving the balance among transport modes will result in increased modal choice and competition, which will increase the efficiency of Maine's transportation system. Maine has a number of underutilized transport modes - railroads, airports, and seaports - that can efficiently transport large amounts of cargo. Greater utilization of rail in particular, as well as air and seaports, would increase competition and relieve the dependency on the traditional road system.

No new data is available for this performance measure since *Measures of Growth 2002*, but the Council has decided to include it in *Measures of Growth 2003* due to the significance of this issue.

Data Source: Maine Department of Transportation, November 2001.

60. Alternative Modes of Travel

Benchmark: Trips made by Maine people using alternative modes of travel will continue to increase relative to vehicle miles traveled in Maine through 2005.

Plus

Travel Using Alternative Modes Slowly Increasing

In 2000, the number of trips made by fixed-route buses, ferries, and airplanes (collectively known as alternative modes) increased 4.2 percent from trips made using the same modes in 1999. The number of vehicle miles traveled by automobiles declined by .03 percent during the same time period. These figures were indexed for ease of comparison. In raw numbers there are a great many more miles traveled by automobile than all other alternative modes combined. In 2000, fixed-bus routes, ferries, and airplanes made an estimated 6.45 million miles of trips in Maine, up from 6.19 in 1999. Maine people traveled 14.15 billion miles in their cars in 2000. This is a slight decrease from 1999, when cars were used to travel 14.16 billion miles. Traveling by any mode generally has a positive impact on the economy because it represents the movement of goods and services. However, alternative means of transport provide a more environmentally beneficial means of travel than vehicular transit, which is generally low occupancy. Increased use of alternative modes of transit is also part of a vibrant and sustainable economy because it increases the competitive choices for travel and movement of people and goods. The graph shows vehicle miles traveled and alternative mode trips indexed to 1994, whereby 1994 values were equalized to 100. No new data is available for this performance measure since *Measures of Growth 2002*, but the Council has decided to include it in *Measures of Growth 2003* due to the significance of this issue.

Data Source: Maine Department of Transportation's Strategic Plan, Strategic Passenger Transportation Plan, Biennial Operating Plans, Transportation Service Providers, November 2001.

APPENDIX H

AGENCY PROGRAM INTERRELATIONSHIPS

Refer to SPO's web site <http://www.maine.gov/spo/energy/energycouncil/pubs.php>

APPENDIX I

Refer to SPO's web site <http://www.maine.gov/spo/energy/energycouncil/pubs.php>

